

- 31 -

**METHOD FOR CONSTRUCTING 3-D GEOLOGIC MODELS
BY COMBINING MULTIPLE FREQUENCY PASSBANDS**

ABSTRACT

A process for constructing a three-dimensional geologic model of a subsurface earth volume wherein resolution scales of multiple diverse data types, including seismic data, are accounted for by generating multiple frequency passband models and combining them together to form the complete geologic model. Preferably, a model is generated for each of a low- frequency passband, a mid-frequency passband, and a high-frequency passband. When integrating seismic data into the modeling process, the seismic-frequency passband constitutes the mid-frequency passband model. The process further contemplates updating tentative frequency-passband models through optimization of assigned rock property values in each tentative model according to specified geological criteria. Such optimization is carried out by perturbation of the rock property values in a manner wherein the frequency content of each model is maintained.